SEQUENCE LISTING

<110> C. Frank Bennett
      Susan M. Freier

<120> ANTISENSE MODULATION OF HKR1 EXPRESSION

<130> RTS-0248

<160> 89

<210> 1
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 1
tccgtcatcg ctcctcaggg   20

<210> 2
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 2
atgcattctg cccccaagga   20

<210> 3
<211> 2772
<212> DNA
<213> Homo sapiens

<220>
<221> CDS
<222> (3)...(2096)

<400> 3
ca ggc gcg tta agc tgg ttg gga ccc ggg aag gcc tcc ctc tta agg   47
   Gly Ala Leu Ser Trp Leu Gly Pro Gly Lys Ala Ser Leu Leu Arg
   1   5   10   15

tct ttc cca cac ctc tgc tcc ttg tta cct gac ttt cgg ctt cag gat   95
Ser Phe Pro His Leu Cys Ser Leu Leu Pro Asp Phe Arg Leu Gln Asp
            20   25   30

ccg cgg cgt gca ccc gcg ttc cat ctg tct tct gag act ttg ccc ttc   143
Pro Arg Arg Ala Pro Ala Phe His Leu Ser Ser Glu Thr Leu Pro Phe
            35   40   45

```
tcc agg aag agc act cag gag acc agg aaa atg gct aca ggg ctc ctg    191
Ser Arg Lys Ser Thr Gln Glu Thr Arg Lys Met Ala Thr Gly Leu Leu
        50              55              60

aga gcc aaa aaa gag gcg ttc gtg gca ttc agg gat gtg gct gtg tac    239
Arg Ala Lys Lys Glu Ala Phe Val Ala Phe Arg Asp Val Ala Val Tyr
        65              70              75

ttc acc cag gag gag tgg agg ttg ttg agc cct gct cag agg acc ctg    287
Phe Thr Gln Glu Glu Trp Arg Leu Leu Ser Pro Ala Gln Arg Thr Leu
80              85              90              95

cac agg gag gtg atg ctg gag act tat aac cat ctg gtc tca ctg gaa    335
His Arg Glu Val Met Leu Glu Thr Tyr Asn His Leu Val Ser Leu Glu
                100             105             110

att cca tct tct aaa cca aaa ctc att gct cag ctg gag cga ggg gaa    383
Ile Pro Ser Ser Lys Pro Lys Leu Ile Ala Gln Leu Glu Arg Gly Glu
            115             120             125

gcg ccc tgg aga gag gag aga aaa tgt cca ctg gac ctc tgt cca gaa    431
Ala Pro Trp Arg Glu Glu Arg Lys Cys Pro Leu Asp Leu Cys Pro Glu
        130             135             140

tcg aag cca gaa att caa ctt agt ccc tcc tgc cct ctg att ttc tcc    479
Ser Lys Pro Glu Ile Gln Leu Ser Pro Ser Cys Pro Leu Ile Phe Ser
        145             150             155

agt cag caa gct ctc agc caa cat gtg tgg ctg agt cat ctc tct cag    527
Ser Gln Gln Ala Leu Ser Gln His Val Trp Leu Ser His Leu Ser Gln
160             165             170             175

ctg ttt tca agt tta tgg gca gga aat cct ctc cac ctg gga aaa cac    575
Leu Phe Ser Ser Leu Trp Ala Gly Asn Pro Leu His Leu Gly Lys His
            180             185             190

tat cca gaa gat cag aaa caa cag cag gat cca ttc tgc ttt agt ggc    623
Tyr Pro Glu Asp Gln Lys Gln Gln Gln Asp Pro Phe Cys Phe Ser Gly
            195             200             205

aaa gca gaa tgg att caa gag gga gaa gac tcc aga ctc ctg ttt ggg    671
Lys Ala Glu Trp Ile Gln Glu Gly Glu Asp Ser Arg Leu Leu Phe Gly
        210             215             220

aga gta agc aaa aat ggc act tca aag gca ctt tcc agc cca cct gaa    719
Arg Val Ser Lys Asn Gly Thr Ser Lys Ala Leu Ser Ser Pro Pro Glu
        225             230             235

gaa caa cag cca gca cag tcc aag gaa gac aac aca gtg gtg gat ata    767
Glu Gln Gln Pro Ala Gln Ser Lys Glu Asp Asn Thr Val Val Asp Ile
240             245             250             255

ggg tcc agc cct gaa cgg agg gca gat cta gag gaa aca gac aaa gta    815
Gly Ser Ser Pro Glu Arg Arg Ala Asp Leu Glu Glu Thr Asp Lys Val
            260             265             270

ttg cat ggt tta gaa gtc tca gga ttt gga gaa atc aaa tat gaa gag    863
Leu His Gly Leu Glu Val Ser Gly Phe Gly Glu Ile Lys Tyr Glu Glu
            275             280             285
```

```
ttt ggg cca ggc ttt atc aag gag tca aac ctc ctt agc ctc cag aag      911
Phe Gly Pro Gly Phe Ile Lys Glu Ser Asn Leu Leu Ser Leu Gln Lys
        290             295             300

aca caa act ggg gag aca cct tac atg tac act gag tgg gga gac agc      959
Thr Gln Thr Gly Glu Thr Pro Tyr Met Tyr Thr Glu Trp Gly Asp Ser
        305             310             315

ttt ggc agt atg tca gtc ctc atc aaa aac cca agg aca cac tct ggg     1007
Phe Gly Ser Met Ser Val Leu Ile Lys Asn Pro Arg Thr His Ser Gly
320             325             330             335

gga aag cct tat gtg tgc agg gaa tgt ggg cga ggc ttt acg tgg aag     1055
Gly Lys Pro Tyr Val Cys Arg Glu Cys Gly Arg Gly Phe Thr Trp Lys
            340             345             350

tca aac ctg atc aca cat cag agg aca cac tca ggg gag aaa cct tat     1103
Ser Asn Leu Ile Thr His Gln Arg Thr His Ser Gly Glu Lys Pro Tyr
            355             360             365

gtg tgc aag gat tgt gga cga ggc ttt act tgg aag tcg aac ctc ttt     1151
Val Cys Lys Asp Cys Gly Arg Gly Phe Thr Trp Lys Ser Asn Leu Phe
        370             375             380

aca cat cag cgg aca cac tca ggg ctc aag cct tat gtg tgc aag gaa     1199
Thr His Gln Arg Thr His Ser Gly Leu Lys Pro Tyr Val Cys Lys Glu
        385             390             395

tgt ggg cag agc ttt agc ctg aag tca aac ctc att acc cac cag agg     1247
Cys Gly Gln Ser Phe Ser Leu Lys Ser Asn Leu Ile Thr His Gln Arg
400             405             410             415

gcg cac act ggg gag aag cct tat gtt tgc agg gaa tgt ggg cgt ggc     1295
Ala His Thr Gly Glu Lys Pro Tyr Val Cys Arg Glu Cys Gly Arg Gly
            420             425             430

ttt cgc cag cat tca cac ctg gtc aga cac aag agg aca cat tca gga     1343
Phe Arg Gln His Ser His Leu Val Arg His Lys Arg Thr His Ser Gly
            435             440             445

gag aag cct tac att tgc agg gag tgt gag caa ggc ttt agc cag aag     1391
Glu Lys Pro Tyr Ile Cys Arg Glu Cys Glu Gln Gly Phe Ser Gln Lys
            450             455             460

tca cac ctc atc aga cac tta agg aca cac aca gga gag aag cct tat     1439
Ser His Leu Ile Arg His Leu Arg Thr His Thr Gly Glu Lys Pro Tyr
            465             470             475

gta tgc aca gaa tgt ggg cgt cac ttt agc tgg aaa tca aac ctc aaa     1487
Val Cys Thr Glu Cys Gly Arg His Phe Ser Trp Lys Ser Asn Leu Lys
480             485             490             495

aca cac cag agg aca cac tca ggg gtt aaa cct tat gtc tgc ctg gag     1535
Thr His Gln Arg Thr His Ser Gly Val Lys Pro Tyr Val Cys Leu Glu
            500             505             510

tgc ggg cag tgc ttt agc ctg aag tca aac ctt aac aaa cac cag agg     1583
Cys Gly Gln Cys Phe Ser Leu Lys Ser Asn Leu Asn Lys His Gln Arg
```

```
                  515                    520                      525

tca cac acg ggg gag aag cca ttt gta tgt acg gag tgt ggg cga ggc   1631
Ser His Thr Gly Glu Lys Pro Phe Val Cys Thr Glu Cys Gly Arg Gly
        530                 535                  540

ttt acc cgg aaa tca acc ctg atc acg cac cag agg aca cac tca ggg   1679
Phe Thr Arg Lys Ser Thr Leu Ile Thr His Gln Arg Thr His Ser Gly
        545                 550                  555

gag aag cca ttt gta tgt gct gag tgt gga cga ggc ttt aat gat aag   1727
Glu Lys Pro Phe Val Cys Ala Glu Cys Gly Arg Gly Phe Asn Asp Lys
560                 565                  570                  575

tcc acc ctc att tca cac cag agg aca cat tca ggg gaa aag cct ttt   1775
Ser Thr Leu Ile Ser His Gln Arg Thr His Ser Gly Glu Lys Pro Phe
                580                 585                  590

atg tgc agg gag tgt ggc aga agg ttt cgg cag aag cct aac ctg ttt   1823
Met Cys Arg Glu Cys Gly Arg Arg Phe Arg Gln Lys Pro Asn Leu Phe
            595                 600                  605

agg cac aag agg gca cac tca ggt gcc ttt gtg tgc agg gag tgt ggg   1871
Arg His Lys Arg Ala His Ser Gly Ala Phe Val Cys Arg Glu Cys Gly
        610                 615                  620

caa ggc ttt tgt gct aag tta act ctc att aaa cac cag aga gca cac   1919
Gln Gly Phe Cys Ala Lys Leu Thr Leu Ile Lys His Gln Arg Ala His
        625                 630                  635

gca ggg ggg aag cct cat gtg tgc agg gag tgt ggg caa ggc ttt agc   1967
Ala Gly Gly Lys Pro His Val Cys Arg Glu Cys Gly Gln Gly Phe Ser
640                 645                  650                  655

cgg cag tca cac ctc att aga cac cag agg aca cat tca gga gag aag   2015
Arg Gln Ser His Leu Ile Arg His Gln Arg Thr His Ser Gly Glu Lys
        660                 665                  670

cct tat att tgc aga aag tgt gga cgg ggc ttt agt cgg aag tcc aac   2063
Pro Tyr Ile Cys Arg Lys Cys Gly Arg Gly Phe Ser Arg Lys Ser Asn
            675                 680                  685

ctt atc aga cat cag agg aca cac tca gga tag aaactttatg tgtataggga  2116
Leu Ile Arg His Gln Arg Thr His Ser Gly
        690                 695

atgtggtaca gcctttagcc aggagtcata cttcatcaga caccagagga cacacacagt  2176

gctgtggctt tttcagccat tgctagatac caaagtggag acattctgtg tgtgattatg  2236

catgagactg tactggtaag acttgtatct ccatccacct gaaggagaat tgctggctca  2296

ttttcaggag ccctgccctt cctcactgtg gatggtgggt tgtggaaacc cggtcaggta  2356

atgatagtgg caggaggcag tcaaatgccc aggcagatag gggtgggtac ctggtgaaac  2416

ccaaccttaa agctgaagac agtcccggct aaatcctcat actgaattga gaacctgtct  2476

tcccatttgg tgtgctttcc tccgattgat cccaaccctt cacctatttt acgtatacct  2536
```

gccctttcct aattggtttt tacactgctg tgcccacctt ttgagtggtg cctttgcata 2596

cttacaaatc agtcaacgtg tattcccta ttctgagccc ataaaagacc cagactcagc 2656

tgcagtgagg agagaaatca ccctgctgtg gaggttgggg accactccct gcatcccctc 2716

tccactgaga gctgttcttt tgctcaataa aattcttttc tacccatcct caccct   2772

<210> 4
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR Primer

<400> 4
tgaaggagaa ttgctggctc a   21

<210> 5
<211> 19
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR Primer

<400> 5
acctgaccgg gtttccaca   19

<210> 6
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR Probe

<400> 6
ctgcccttcc tcactgtgga tggtg   25

<210> 7
<211> 19
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR Primer

<400> 7
gaaggtgaag gtcggagtc   19

<210> 8

```
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR Primer

<400> 8
gaagatggtg atgggatttc                                              20


<210> 9
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR Probe

<400> 9
caagcttccc gttctcagcc                                              20


<210> 10
<211> 11173
<212> DNA
<213> Homo sapiens

<220>

<400> 10
aagcttcttg gctctctaag ttttattttc tattcactgt gagaagtact tggctattat    60

ttcaatattt ttcctgtccc ttttactctt tcctctcatt ctaggactcc caatttacct   120

gtatattgga ctgctggaaa tgtgtttctg aagattcata ttgtctcata agcttctgtt   180

catttttctt cagtcttttt tctctttttt gaggggtggg tggatatatg taatttctat   240

tcttttattt tcaaattcac taatctttct tcttttttctg tttgctatta aacctgtcta   300

gtgaattttt aaatttcagt tgttttttttc tttcccccctc ccctcctctc ccctcctctc   360

ccctcccctc ccctccctc ccctcccctc ccctccctc ccctccctc ctcttgtttc     420

tgtgggtttt aggagtgctc tcaggcaaga aagccacaaa caaaattatt acccctttct   480

gttgcaattt tttgagcata aactcttccc catcttctgg ctggttatgt atattttcca   540

gtgcctttga gtagttattt gttatatttt atccagtctt attattttct gctgcagggt   600

tcttgtgacc atttcagtct gctggcattt tcgttagtgg gcttcctcat acttattttt   660

gaattgattt ttggaaattg cttcaaaatt acagaatatt tgcaaaaata aaaatagtag   720

aataaatata tatggtgcag tgagttgtat gtggtttgtc cccaccacaa ctcatggtga   780

aatttaattg ccagtttaac ggtattgaaa ggtggtgggg cctttaagag gtgtttggtt   840
```

```
gtggcatctc tgccctctcg aatggcttat gcagactggg ttagttcttt tggactgggt    900

tggttctcgt gagatcaagt tgttataaaa caaggcttcc tctgatgttt ggcctctttg    960

catgcacttg ctttcccttc ctctttctgc tgtgatttga agcagcatga gaccatcacc   1020

aaatgggcta ccatccaacc tccagaattg tgagccaaat aaactttttt gtaaattacc   1080

cagtctcagg tattctgtta tagcaataca aaacagatta agacatatgg catatatgtt   1140

attatataaa tggcatcata aaatgaccta ctattttact tagtttgctt tatcatttat   1200

tcatgtgctc ttttgcatgc atacccttcc tccttccttc ccctttctca gtacatatgt   1260

atgtatgtgt atatgtatat gtatgttcat atgtgtttgt tttgtttttg tctttgtttt   1320

tgttttgtt ttttgagaca gagtctcgct ctgtcaccca ggctggagtg cagtggcacg    1380

atctcggctc actgcaacct ccgcctcctg ggttcaagcg attctcctgc ctcagcctcc   1440

caagtagctg ggattacagg tgcacgccac catgcctggc taattttgt gttttagta     1500

gagacaggt ttcaccatgt tagtcaggct ggtcttgaac acctgacctc atgatctgct    1560

cacctcggtc tcccaaagtg ctgggattac aggcgtgagc caccacccc ggcctgtaag     1620

tgtttgtttc tgtgaatttt ctaagaatgt cgatattgtc tcatataacc acagtgtggt   1680

tatcagcctc agtaaactta actttgatac agtcattttg cctgttatct accattcgta   1740

ttataatttt gtcaacatat agaataatat ggtttttac tttccagaac ataatctagt    1800

ccaaggttag ttagttcatt ttcatgtcat gtctataatt attattaagg gaagggaatt   1860

attatttcaa taatctttct ctgtctttta aacattgac atttcatttg tttatttaat    1920

tttagattca gagtgtacat gtgcaggttt gttacatggg tatattatgt aatgctgggg   1980

tttggggctt ctattgaacc tatcacccaa atagtttaca tagtacctga taggtagttt   2040

ttcagccctt acctccatcc tttttcccct gttttggagt ccccagtgtc tattattcc    2100

atctttatgt ccgtgtgtac ccattgttta gctcctactt gtgagaacat aggttatttg   2160

attttctgtt tctgcattga ttcacttagg atgatggcct ctagctgcat ccatgttgct   2220

gcagaggaca tgatttcatt cttttttatg gctgcatagt atttcatggt gtgtgtgtac   2280

cacattttat ttatccagtc cactattgat gggcctatac gaagattcca tgactttgct   2340

gttgggaata gtgctgcgat aagcatacga gtgcaggtgt cttctggtag aacaatttat   2400

tttcccagtc ttgggattgt tggattgaat ggtagttcta tttttagttc cttgagaaat   2460

ttccatactg tttgccatac aggttgaact aatttacatg accaccaaca atatataagc   2520

attccctgtt ctgtgcatcc tcactaacat ctgttttttt gtttgtttgt ttgtttgttt   2580

aactttttaa taatagccat tctgactggt gtgagatggc ctatcttctt gtgggttttc   2640
```

```
ttttcccatc cttcactggt accaagatct ctttgtggtt gtaatttgta tttctctgat   2700

gattagtgat tttgagcatt ttttatgttt gctccctgtt tgtgtacctt cttttgagaa   2760

gtatctgttt atgtcctttg ctcacttttt aatgaggtta tttgggtttt tgttgttgat   2820

ttgtttaagt tccttatgtt tctgcatatt agtcctttgt aagatgcatg gttcgcaaat   2880

gctttctccc attctgtagg ttgtcttttt actctgttga ttgtttcttt tgcagtgcag   2940

aagctctttt gcttaattaa atcatatttg tccatttttg tttttgttgc aatcgctttt   3000

gaggacttag tcataagttc tttgccttgg ccaatgtcca gagaagtttt tcctagtttt   3060

cctttaggaa ttttatagtt tgaggtctta catttaagtc tttcatccat cttgagttga   3120

tttgtgtata tgaggggggaa gggtccagtt tcattctctt gcatgtggct ggacagtttt   3180

cccagcatca tttattgaat agggtgtcct ttccccattg tttatttctg tcagctttct   3240

cgtagatcag ttggtagtag gtgtgtggtt ttatttctgg gttctctgtt ctgttccgta   3300

gatctatatg tctatttttg tacttacacc gtgctgtttc agttaatata gccttgtagt   3360

atagtcaaag tcaggtaatg tgatatttcc agctttgttc tttttgttta ggattgcttt   3420

ggctagtcag gctttgttgg tcccatatga attttagaat tgttttttct agttctgtta   3480

gaatgttaga atgacaaatg atgttggtaa tttgatagga attgcattga atctgtagat   3540

tgctttgggc agtatcatca ttttaactat attgattctt aacaatctat gagcatagaa   3600

tgttttttccc tttgtgtcat ctgtgatttc tttcatcagt gttttgtagt tctcctcgca   3660

gagacctttc acctctttgg tttgatgtat tcttaggcat tttgtgtgtg tttgcattcg   3720

tgtggctatt gtaaatggga tcttgttctt tatttggctc taagcttgaa tgttactggt   3780

gtatagaaat gctattgatt tttgtacatt gattttgtat cctggaactt tactgaattt   3840

tttttttttaa tcaggtttag gagtcttttg gagggacctt tagagttttc taggtatagg   3900

attatttttct aggtatagga ttttctaggt aaaggattct tggcgaacag agataatttg   3960

actccctctt ttcctatttg gatgcctttt atttctctgt cttgcatgat tgctttctct   4020

aggacttcca gtactaagtt gaatacgagt ggtgagagca gacatccttt tcttgttcca   4080

cttcttaggg ggaatggttt cagctttcgc ccattcagta tgaagttggc tgtaggtctg   4140

tcacagataa ctcttcttat tttgaggtat gttcctttga tgcctagttt gttaaagatt   4200

tttatcatga aggggtgttg gattttatcc gatgcttttt ttacatctat taagatgatc   4260

tttttttttt tttttttttt ttttgtgttg agacggagtc ttgctctgtc accctggctg   4320

gagtgcagtg gcgcgatctc ggctcactgc aagctccgtc tcccaggttc acactattct   4380
```

```
cctgcctcag cctctctgag tagctggaac tacaggcgcc caccaccaag cctggctata  4440

ttttttgtatt tttttagtag agatggggtt tcaccgtggt ctcaatctcc tgacctcgtg  4500

atccgcccgc ctcagcctcc caaagtgcta ggattacaag catgagccac cacacctggc  4560

cggttttttgt ttttaatcct gtttatgtga tgaatcacat ttattgaaca ctgacatttt  4620

agaatacaat tcctcagttc tcactttttt ttttttttctt ttttgagatg aagtctcact  4680

ctgttgccta ggctggagtg cagtggcgcg atctcggctc actgcaacct ccacctcctg  4740

gtttcaagca gttctctgcc tcagcctccc gattagctgg gactacaggt gcgtgccacc  4800

atgcctggct aagttttgta tttttagtag agacaggatt tcaccatctt ggccaggctt  4860

gtcttgaact cttgccctca ggtgatccac ccaccttggc ctcccaaagt gctgggatta  4920

caggcgtgag ctaccgcgcc tggccagttc tcactttta aaatagcttt actgaggtat  4980

aatttacatg ccataaaatt acttattgta tgtatacagt tcaatatata tatattttt  5040

ttttgagatg gagtttcact gttgtagccc atgctggagt gcagtggcac aatctcggct  5100

cactgcaacc tctgcctcct gggttcaagt gattctcctg cctcagcctc ccgagtagct  5160

gggattacag gcatgtacca ccaggcctgg ctaattttgt atttttggta aagacagggt  5220

ttctccatgt tggtcaggct ggtctcaaac ttccgacctc aggtgatccg ccacctcagc  5280

cttccaaagt gctgggatta caggcgtgaa ccgccgcacc tggcctgtgt gtgtacagtt  5340

caataatttt tagtaaactt atagagttat atgattgtca cctctattca acatttctgt  5400

cacaccagaa agttctcatg tgcccatttg cattcatccg tcctcccatc agaggaaacc  5460

attgatttgt ttactgtcta tagatttgct gtttctagac gtataagaat ggcattgtga  5520

aatatatagt ctttttcttt ttttttttt agatggagcc ttgctctgtt gccaggctgg  5580

aatacagtgg tgttatatcg gctcactgca acctctgcct cctgggttca agcaattccc  5640

ctgcctcagc ctcctgagta gctgggacta caggtgcaca ccaccacacc tggctaattt  5700

tttgtatttt agtagagacg gggtttcacc atgttggcca ggatggtctc aatctcctga  5760

ccttgtgatc cacccgcctc agcctcccaa agtgctggga ttacaggcat gagccaccat  5820

gcctggccct tttcattgtt tattaaccat ttgcatatct ttttagtaa aatgcctatt  5880

caattctttt ctttatttta aaattagatt gtgttcttat tgaattgtaa gaatttttag  5940

tatattctag acacaagtcc tatatcaata taggattttc agatatttct ccctgtctgt  6000

ggcttatctt ttcattttct caatggtgtc atttcaggca caaaagtttt aaatgctgat  6060

taagtttaac ttaccaattt ttaaaatggg ttgtgctttt ggtgttgtaa ctaagaactt  6120

tattcttaac tcaaggttat gaagattttc ttcactggtt tcttctagaa gttttacagt  6180
```

```
tttagctctt acatttagag ctacaatcca ttttagttaa tttttatgta tcaaatgagg   6240

tgaaaatcta aattcatttt cttgcatatg aatattcagt tgtccttaca atctcatata   6300

aagagtatcc ttcctcccat tgaattacct tggcaccttt atcaaaaatc agctgactgt   6360

gaatctaagt gttcatttct agtctcctga ttttgttcca tgatctccat cttcctccta   6420

tgacagtagc acactatctt cattactgta gctttatatt aagttttgaa gttagaagta   6480

tacactcccc aactttattt tcttttttcag aaattgtttt gtctatttta tgtcctttga   6540

atttcaatgt aagtttagg atcagattgt gaatttccaa aagggaaaaa aaccaaaagc   6600

ctgctgtggt tgtgatacca tgattatgtt gaatctgcag ataaattttg gtgagaatca   6660

ccatcttaat aatagtaagc cttccaatct atgactgtct ccctatttat ttggagcttt   6720

aacttcattc aacaatgttt gttaattttc tttttaaaaa tctttcttct tttcctcctt   6780

tcctttcctt ttctctttct cttctctttc tttcatccca ctatgttgcc caaactggcc   6840

tctaacttct ggcctcaagc aatcctccca cctcagcctc cttaagtgtt gggattacag   6900

gcatgagcca ccgtgcccag ccttaatttt cagtttacaa actttgtgct actttgtcac   6960

atttattcct tagcatttta ttatttttat gctatcgtga atagtattgt tttctcagtt   7020

tcatttttag aatagtcatt gctagtatat agaaatataa ttattttta tatatttatc   7080

ttatatgacc taagtacaat tatgacttct agttgctttt ttgaaatttt atgcttacaa   7140

aattatataa tctgtgaaca agagattttt tttacttctt cctttctagt taagatgcct   7200

ttcatttatt ttctcctcat tttgtttgtc ttctcctttt tttttttttt tttttgaga   7260

cagagtctca ctgtgtcacc aggctggagt gtggtggcac gatctcagct cactgcaacg   7320

tccgcctccg gggttcaagc gattctcctg cctcagcctc ccaagtagcc gagactacat   7380

gtgtgtgcta ccatagccag ctaatttttc tattttagt ggagacaggg tttcgccatg   7440

ttggccagga tggtctcaat ctcttgacct cgtgatctgc ccgcctcggc ttcccaaagt   7500

gttgggacta caggcgtcat aagttttga gaacacgtgc aatatttgcc acttcttctt   7560

tcttcttctc cttttccttc tcctcctcct cctccttctt cttccttcct ttctctttct   7620

cttttctgtg tctccctctt ttgaattcaa ccccttaaaa aggtaaaaac cattttttagc   7680

tggcaggcca tacagaaaca ggtttcaggc tggatttggc ctgtcaggtg agtttgccaa   7740

ctcctgcaat agaaaatgta atgcataggg ctagacacag tggcttatgc ctgtaatccc   7800

agcactttgg gaggcttagg ctgacctgag gtcaggagtt caagaccagc ctggcaaaca   7860

cggtaaaact ctgtctctac taaaaataca aaaattagct gggcgtagtc ttggacgcct   7920
```

```
gtaatcccag ctactcggga ggctaaggca ggagaatcgc ttgaaccctg gaggcggagg   7980

ttgcagtgag ctgagatcgc accactgcac tccagcttgg gtgaaagaaa gactccgttt   8040

aaaaaaaaaa acaaaaaaac aaaagaaagt gtaatgcatg aagtgaaatg aaaaatagat   8100

gctgggaagg atgtctaact gggagatagc ttgtgatgta aatatgtaaa tatattatga   8160

atgaccagtg ggcaaggcaa aattgcctac acagccctac ctatggcccc tctgaaaatg   8220

ttctttcttc agcagaatcg aagccagaaa ttcaacttag tccctcctgc cctctgattt   8280

tctccagtca gcaagctctc agccaacatg tgtggctgag tcatctctct cagctgtttt   8340

caagtttatg ggcaggaaat cctctccacc tgggaaaaca ctatccagaa gatcagaaac   8400

aacagcagga tccattctgc tttagtggca aagcagaatg gattcaagag ggagaagact   8460

ccagactcct gtttgggaga gtaagcaaaa atggcacttc aaaggcactt ccagcccac   8520

ctgaagaaca acagccagca cagtccaagg aagacaacac agtggtggat atagggtcca   8580

gccctgaacg gagggcagat ctagaggaaa cagacaaagt attgcatggt ttagaagtct   8640

caggatttgg agaaatcaaa tatgaagagt ttgggccagg ctttatcaag gagtcaaacc   8700

tccttagcct ccagaagaca caaactgggg agacacctta catgtacact gagtggggag   8760

acagctttgg cagtatgtca gtcctcatca aaaacccaag gacacactct gggggaaagc   8820

cttatgtgtg cagggaatgt gggcgaggct ttacgtggaa gtcaaacctg atcacacatc   8880

agaggacaca ctcaggggag aaaccttatg tgtgcaagga ttgtggacga ggctttactt   8940

ggaagtcgaa cctctttaca catcagcgga cacactcagg gctcaagcct tatgtgtgca   9000

aggaatgtgg gcagagcttt agcctgaagt caaacctcat tacccaccag agggcgcaca   9060

ctggggagaa gccttatgtt tgcagggaat gtgggcgtgg ctttcgccag cattcacacc   9120

tggtcagaca caagaggaca cattcaggag agaagcctta catttgcagg gagtgtgagc   9180

aaggctttag ccagaagtca cacctcatca gacacttaag gacacacaca ggagagaagc   9240

cttatgtatg cacagaatgt gggcgtcact ttagctggaa atcaaacctc aaaacacacc   9300

agaggacaca ctcaggggtt aaaccttatg tctgcctgga gtgcgggcag tgctttagcc   9360

tgaagtcaaa ccttaacaaa caccagaggt cacacacggg ggagaagcca tttgtatgta   9420

cggagtgtgg gcgaggcttt acccggaaat caaccctgag cacgcaccag aggacacact   9480

cagggagaa gccatttgta tgtgctgagt gtggacgagg ctttaatgat aagtccaccc   9540

tcatttcaca ccagaggaca cattcagggg aaaagccttt tatgtgcagg gagtgtggca   9600

gaaggtttcg gcagaagcct aacctgttta ggcacaagag ggcacactca ggtgcctttg   9660

tgtgcaggga gtgtgggcaa ggcttttgtg ctaagttaac tctcattaaa caccagagag   9720
```

```
cacacgcagg ggggaagcct catgtgtgca gggagtgtgg gcaaggcttt agccggcagt 9780

cacacctcat tagacaccag aggacacatt caggagagaa gccttatatt tgcagaaagt 9840

gtggacgggg ctttagtcgg aagtccaacc ttatcagaca tcagaggaca cactcaggat 9900

agaaacttta tgtgtatagg gaatgtggta cagcctttag ccaggagtca tacttcatca 9960

gacaccagag gacacacaca gtgctgtggc tttttcagcc attgctagat accaaagtgg 10020

agacattctg tgtgtgatta tgcatgagac tgtactggta agacttgtat ctccatccac 10080

ctgaaggaga attgctggct cattttcagg agccctgccc ttcctcactg tggatggtgg 10140

gttgtggaaa cccggtcagg taatgatagt ggcaggaggc agtcaaatgc ccaggcagat 10200

aggggtgggt acctggtgaa acccaacctt aaagctgaag acagtcccgg ctaaatcctc 10260

atactgaatt gagaacctgt cttcccattt ggtgtgcttt cctccgattg atcccaaccc 10320

ttcacctatt ttacgtatac ctgccctttc ctaattggtt tttacactgc tgtgcccacc 10380

ttttgagtgg tgcctttgca tacttacaaa tcagtcaacg tgtattcccc tattctgagc 10440

ccataaaaga cccagactca gctgcagtga ggagagaaat caccctgctg tgggggttgg 10500

ggaccactcc ctgcatcccc tctccactga gagctgttct tttgctcaat aaaattcttt 10560

tctacccatc ctcacccttc aattgtcagt gtatcctcat tctttttgga ctcaggacaa 10620

gcgctcagaa ccactaaaca tgggtataag ctataataca ggcaggccaa gagggcaggg 10680

cacctccagc agcaggccca gggctaagtg agatccaggc agagggctgt cgctggctgt 10740

ggaggtcctc agttggcaat gtggctgaga aaattcctgt gtcagtaact tgacggagaa 10800

agtactttta aatgggttga aattaggaaa tgaatactat tccagtgtca ttttacaggt 10860

acactggaac attccttcca ctgtaccctg gatgttacag aaactattgc gggaatgaag 10920

gaggaccaga gagaccatgg ggtgagacag gaggatttat ttatttattt ttttgagaca 10980

gagtctcgct ctgtcaccca ggctggagtg cagtggcgcg atctcggctc actgcaggct 11040

ccgcccccca ggttcacgcc attcttctgc ctcagcctcc cgaggagctg ggactacaag 11100

tgcctgccac ctcacccggc taattttttg tatttttagt agagatgggg tttcactgtg 11160

ttagccagga tgg                                                     11173
```

<400> 11
tgagatgaag tctcactctg ttgcctaggc tggagtgcag tggcgcgatc tcggctcact   60

gcaacctcca cctcctggtt tcaagcggtt ctctgcctcg gcctcccgat tagctgggac   120

tacagaatcg aagccagaaa ttcaacttag tccctcctgc cctctgattt tctccagtca   180

gcaagctctc agccaacatg tgtggctgag tcatctctct cagctgtttt caagtttatg   240

ggcagg   246

<210> 12
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 12
aaagacctta agagggaggc   20

<210> 13
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 13
aagtcaggta acaaggagca   20

<210> 14
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 14
aagccgaaag tcaggtaaca   20

<210> 15
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 15
tcctggagaa gggcaaagtc   20

```
<210> 16
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 16
tcctgagtgc tcttcctgga                                        20


<210> 17
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 17
agaccagatg gttataagtc                                        20


<210> 18
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 18
cagtggacat tttctctcct                                        20


<210> 19
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 19
tctggacaga ggtccagtgg                                        20


<210> 20
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 20
gggactaagt tgaatttctg                                        20
```

```
<210> 21
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 21
cttgctgact ggagaaaatc                                                    20


<210> 22
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 22
gttggctgag agcttgctga                                                    20


<210> 23
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 23
gccacacatg ttggctgaga                                                    20


<210> 24
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 24
gagagagatg actcagccac                                                    20


<210> 25
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 25
```

```
atttcctgcc cataaacttg                                                    20


<210> 26
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 26
cagaatggat cctgctgttg                                                    20


<210> 27
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 27
atccattctg ctttgccact                                                    20


<210> 28
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 28
ggagtctgga gtcttctccc                                                    20


<210> 29
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 29
ctcccaaaca ggagtctgga                                                    20


<210> 30
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide
```

```
<400> 30
cctttgaagt gccatttttg                                                    20


<210> 31
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 31
aagtgccttt gaagtgccat                                                    20


<210> 32
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 32
gactgtgctg gctgttgttc                                                    20


<210> 33
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 33
ttgtcttcct tggactgtgc                                                    20


<210> 34
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 34
ccctatatcc accactgtgt                                                    20


<210> 35
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide
```

```
<400> 35
agggctggac cctatatcca                                            20


<210> 36
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 36
ctgtttcctc tagatctgcc                                            20


<210> 37
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 37
ccttgataaa gcctggccca                                            20


<210> 38
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 38
ggaggtttga ctccttgata                                            20


<210> 39
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 39
ctccccagtt tgtgtcttct                                            20


<210> 40
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
```

<223> Antisense Oligonucleotide

<400> 40
gtccttgggt ttttgatgag   20

<210> 41
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 41
tttgacttcc acgtaaagcc   20

<210> 42
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 42
cgacttccaa gtaaagcctc   20

<210> 43
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 43
tgtccttaag tgtctgatga   20

<210> 44
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 44
attctgtgca tacataaggc   20

<210> 45
<211> 20
<212> DNA
<213> Artificial Sequence

```
<220>
<223> Antisense Oligonucleotide

<400> 45
ttatcattaa agcctcgtcc                                                    20


<210> 46
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 46
ggacttatca ttaaagcctc                                                    20


<210> 47
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 47
gtgtgaaatg agggtggact                                                    20


<210> 48
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 48
gccgaaacct tctgccacac                                                    20


<210> 49
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 49
aacaggttag gcttctgccg                                                    20


<210> 50
<211> 20
<212> DNA
<213> Artificial Sequence
```

```
<220>
<223> Antisense Oligonucleotide

<400> 50
gtgccctctt gtgcctaaac                                                    20


<210> 51
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 51
ctccctgcac acaaaggcac                                                    20


<210> 52
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 52
ttaatgagag ttaacttagc                                                    20


<210> 53
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 53
ggtgtttaat gagagttaac                                                    20


<210> 54
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 54
actttctgca aatataaggc                                                    20


<210> 55
<211> 20
<212> DNA
```

<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 55
aaagtttcta tcctgagtgt   20

<210> 56
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 56
ctgtaccaca ttccctatac   20

<210> 57
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 57
tatgactcct ggctaaaggc   20

<210> 58
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 58
gcaatggctg aaaaagccac   20

<210> 59
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 59
ggtatctagc aatggctgaa   20

<210> 60
<211> 20

<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 60
tcacacacag aatgtctcca   20

<210> 61
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 61
tcatgcataa tcacacacag   20

<210> 62
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 62
gtcttaccag tacagtctca   20

<210> 63
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 63
agcaattctc cttcaggtgg   20

<210> 64
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 64
aaaatgagcc agcaattctc   20

<210> 65

```
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 65
aacccaccat ccacagtgag                                                    20


<210> 66
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 66
ggtttccaca acccaccatc                                                    20


<210> 67
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 67
ctgggcattt gactgcctcc                                                    20


<210> 68
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 68
ctatctgcct gggcatttga                                                    20


<210> 69
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 69
caggtaccca cccctatctg                                                    20
```

```
<210> 70
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 70
aaggttgggt ttcaccaggt                                                    20


<210> 71
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 71
tttagccggg actgtcttca                                                    20


<210> 72
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 72
aattcagtat gaggatttag                                                    20


<210> 73
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 73
accaaatggg aagacaggtt                                                    20


<210> 74
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 74
aaaggcacca ctcaaaaggt                                                    20
```

```
<210> 75
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 75
atttgtaagt atgcaaaggc                                           20


<210> 76
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 76
ggtcttttat gggctcagaa                                           20


<210> 77
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 77
cactgcagct gagtctgggt                                           20


<210> 78
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 78
atttctctcc tcactgcagc                                           20


<210> 79
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 79
gagtggtccc caacctccac                                           20
```

```
<210> 80
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 80
aacagctctc agtggagagg                                              20


<210> 81
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 81
agaaaagaat tttattgagc                                              20


<210> 82
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 82
actatgtaaa ctatttgggt                                              20


<210> 83
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 83
gagcttctgc actgcaaaag                                              20


<210> 84
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 84
```

agcttgcagt gagccgagat   20

<210> 85
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 85
atgcctgtaa tcccaacact   20

<210> 86
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 86
ttcgattctg ctgaagaaag   20

<210> 87
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 87
gcctaggcaa cagagtgaga   20

<210> 88
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 88
ttctgtagtc ccagctaatc   20

<210> 89
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 89
aatttctggc ttcgattctg   20